

The Immature Stages of *Catocala erichi* Brower (Lepidoptera: Noctuidae)

John W. Johnson

and

Erich Walter

Assistant Research Biologist, Museum of Systematic Biology, University of California, Irvine, CA 92717 and 546 South Clementine Street, Anaheim, CA 92805

Abstract. The eggs and larvae of *Catocala erichi* Brower are described, and some notes presented on the larval feeding and resting behavior in the laboratory.

Catocala erichi Brower (1976) was named from specimens collected in the San Bernardino Mountains, California. Walter and Johnson have reared broods from ova of three females collected in the type locality. Descriptions of the immature stages were prepared from the most recent rearing in 1978. In the descriptions of the larvae, the chaetotaxy of Hinton (194) and of Hasenfuss (1963) will be followed (Fig. 4).

Egg. Shape hemispheroidal, somewhat flattened at the microscopically reticulate, polar, micropylar area, the egg base broad, flat. Micropylar area enclosed by a sharp-edged, polygonal ridge, from which sharp-edged ribs radiate down the sides, some ribs forking just below their origin (Fig. 1). Troughs between the ribs crossed by regularly spaced, delicate septa, these continuous around the egg, forming a reticulate sculpturing of the chorion. Egg brown at oviposition, the fertile eggs developing a pattern within the first days; the micropylar area and adjacent surface, light gray, the gray encircled by an interrupted, dark brown band. Basad, half-way down the sides, a light gray, interrupted ring, edged below by another broad, dark brown band. The base, pale brown. Egg diameter, 1 mm.

First Instar Larva. Head dark brown, lighter about the mouth and frontal suture. Setae black, inconspicuous; sutures inconspicuous.

Body dark gray-brown; cervical sclerites dark brown. A wide, longitudinal stripe of lighter color on the dorsum from TII to A10. At its edges, through the D2 setae of TII and TIII and the D1 and D2 setae of A1 to A10, a longitudinal, narrow, dark brown line. Next ventrad a second, wider, heavier, dark brown line through the SD2 setae of TII and TIII and dorsad of the SD1 abdominal setae, to A10; light brown between the lines and on the lower border of line 2. The middle and lower sides dark brown, interrupted by light areas. Body setae small, black, from black bases. Thoracic legs dark brown. Prolegs of A5 and A6 with broad, lateral, dark brown stripes.

Second Instar Larva. Head light brown, reticulate with fine, dark brown lines. The front rimmed at each side, anterior to the ocelli, by an interrupted, heavy, black line curving from the vertex ventrad to the antennal base. Setae black, small; sutures inconspicuous.

Body brown. From TI to the anal valve, a wide, light-gray, middorsal line forming whitish spots at the caudal edges of the segments. Setae black, inconspicuous, bases brown. On the sides, four longitudinal, dark brown stripes from TI to A10; upper two stripes narrow, separated by lighter brown; lower two stripes wide, covering the sides to the venter, separated by a narrow, discontinuous line of lighter brown. Laterally, between A5 and A6, an oblique, dark, chocolate brown patch from the edge of the dorsal midline to the prolegs. Between A6 and A7, a smaller, lateral, dark brown patch, the color continuing on the lower sides of A8 and A9. Thoracic legs banded in light and dark brown; prolegs light gray-brown. Venter pale brown; median spots dark brown, largest on A1 to A4, to TI and A9.

Third Instar Larva. Head as in the second instar, with these changes: orange protuberances dorsad of the P1 setae; orange lines descending the front from the protuberances to the black A1 setae. Other lower setae white; more dorsal setae black, their bases brown.

Body a rich medium brown. Dorsum almost white, middorsal line narrow, brown, interrupted. Through the dorsal setae, and laterad and ventrad, parallel, longitudinal lines and stripes of light and dark brown, alternating, to the ventral filaments. Ventral filaments light brown. On A5, a dark brown, middorsal tubercle, center light brown. On the sides of A5 and A6, an oblique, chocolate brown patch from the A5 tubercle to the prolegs. On the lower sides of A7 and A8, a dark brown shading. On A8, a transverse dorsal ridge bearing the large D2 setal bases, the ridge edge dark brown, the brown continuing forward briefly on the sides. On A9, a lesser ridge and setae.

Fourth Instar Larva. Largely as in the third instar. The oblique patch on the sides of A5 and A6, rich orange-brown.

Fifth Instar Larva. (Fig. 2). Head light brown, reticulate with dark brown lines. Upper setae pale brown; lower setae nearly white. Head bilobed; prominent, orange protuberances at the apices of the vertex lobes dorsad of setae P1. Coronal and frontal sutures paralleled by brown lines. The front rimmed dorsally and laterally by a broad, netted, dark brown line, lighter dorsad, becoming nearly black laterad to the antennal bases. Ocelli I to IV black, V and VI clear. Antennae, mandibles, labrum, lower clypeus, light brown, the mandibles black-edged. Frons-clypeus dorsad, darker brown. Genae light brown.

Body color varying from pale gray-brown, to orange-brown, to dark gray-brown, stippled generally in dark gray and black; pattern lines of variable intensity. Bases of the D2 setae, large, raised, orange; other setal bases raised, brown. Dorsum light brown, middorsal line dark gray, interrupted. Through the dorsal setae, a wide, longitudinal, dark brown stripe from TI to A10, bordered below by a wide, light brown stripe. More ventrad, a third stripe, dark brown, through the SD1 setae, spiracles, and L1 setae. Lower sides paler. On A5, a transverse, dorsal ridge between the D2 setae, bearing the flattened, middorsal tubercle, the ridge and the tubercle orange and brown; D2 setal bases of A5 large, orange. On A8, a transverse, dorsal ridge, bearing large, orange D2 setal bases, the ridge caudal edge dark brown, the brown continuing ventrad and forward beyond spiracle A8. A9, with lesser ridge

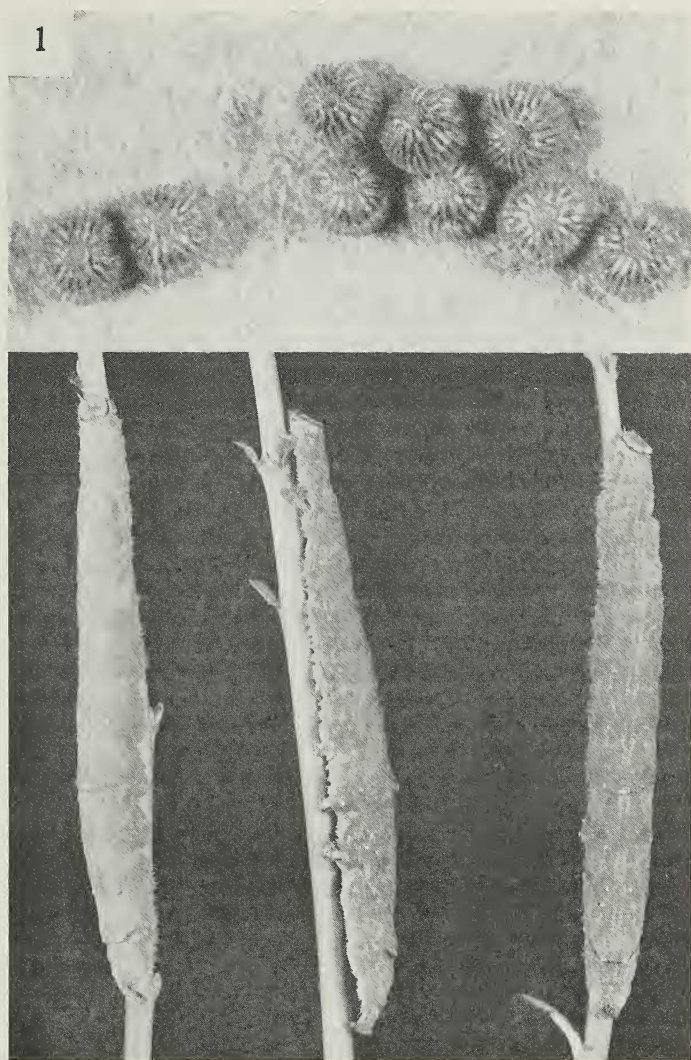


Fig. 1. *Catocala erichi* fertile ova. Diameter 1 mm.

Fig. 2. *Catocala erichi* fifth instar larvae, showing color variations. Length 68 mm when photographed.

and setae. Anal valve orange-brown. Thoracic legs light brown, tibiae black-edged, tarsi dark, accented by light brown. Prolegs pale, yellow brown, a dark spot near bases, vertical dark lines distally. Spiracles pale brown, black-rimmed. Inter-segmental folds of A1 to A5, orange-brown. The oblique, lateral patch on A5 and A6 inconspicuous (see Brower, 1976, p. 37). Ventral filaments nearly white. Venter pale yellow-brown; median spots on T1 to A9 purplish-black.



Fig. 3. *Catocala erichi* adults. Above: male, 67 mm span. Below: female, 65 mm span. Both adults from the larval brood of Fig. 2.

Rearing Notes. The ova were held overwinter outside under shelter on a north wall, except for a period in refrigeration at about 5°C during January. Hatching was staggered from March 22, 1978, to April 13. Hatching may be expected six weeks later in the mountain habitat. The larvae were reared on *Salix lasiolepis* Benth. (Munz, 1974). For the first larva: eclosion March 22; moults, March 27, April 2, April 8, April 14; spinning, April 25; emergence of an adult male, May 30 (Fig. 3). Larval and pupal periods each 35 days. In nature, no adults have been taken before August 1.

First instar larvae rested closely applied to leaf edges and veins beneath leaves. They fed at all hours. Second instar larvae rested on veins beneath leaves, on rearing box walls, and on cloth-covered openings, the head closely pressed to surfaces. Feeding, chiefly at night. Third instar larvae rested on foliage, stems, and box walls. Of 31, 11 rested head up, 15 head down, 5 horizontally. Feeding, at night only. Fifth instar larvae were transferred to potted, rooted willow cuttings in net sleeves, outside in full sun. Larvae rested chiefly on large willow stems. On April 13, on willow stems, 18 were head up, 19 head down, on sleeve netting, 4 horizontal. In nature the food plants surely are willow species of the high mountains.

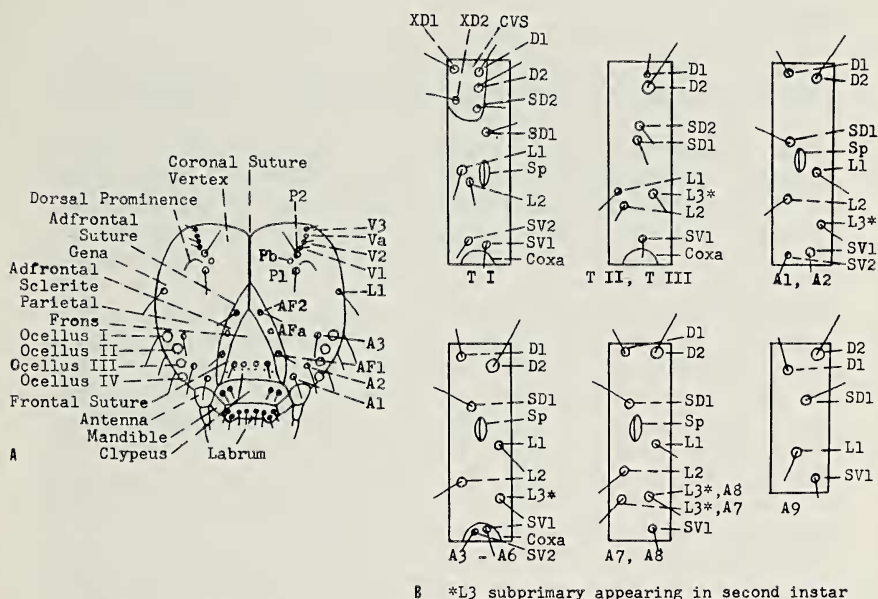


Fig. 4. Chaetotaxy of head and body in *Catocala*, adapted from Hinton and Hasenfuss.

- A. Head regions, sutures, setae, and sensoria; setae with capital letter and numeral; sensoria with capital letter and small letter. A, anterodorsal; AF, adfrontal; L, lateral; P, posterodorsal; V, vertex.
- B. Setae of thorax and abdomen, segment 10 omitted. CVs, cervical sclerites; XD, anterior dorsal tactile setae of T1; D, dorsal; SD, subdorsal; L, lateral; SV, subventral; Sp, spiracle; T1, TII, TIII, thorax; A1 to A9, abdomen.

Acknowledgments. The authors express their gratitude to Mr. Gordon Marsh, Curator, Museum of Systematic Biology, University of California, Irvine, for his assistance, to his librarians and staff in the preparation of the manuscript, and to Dr. A. E. Brower for assistance in the identification of specimens.

Literature Cited

- BROWER, A. E., 1976. New *Catocala* of North America (Noctuidae). J. Lepid. Soc., 30(1):33-37.
- HASENFUSS, I., 1963. Vergleichen-morphologische Analyse der regularen Borstenmuster. Zeitschr. Morph. und Okol. Tiere, 52(3):14-364.
- HINTON, H. E., 1946. On the homology and nomenclature of the setae of lepidopterous larvae, with some notes on the phylogeny of the Lepidoptera. Trans. Roy. Ent. Soc. London, 97:1-37.
- MUNZ, P. A., 1974. A Flora of Southern California. Univ. Calif. Press, 1086 p.